A VALVE SEAL, AND A DEVICE FOR THE DISPENSING OF A FLUID PRODUCT THAT INCLUDES SUCH A SEAL

This present invention concerns a valve seal and a device for the dispensing of a fluid product that includes such a seal.

One is familiar, in particular for the dispensing of pharmaceutical products, with the use of devices of the aerosol type, in which the product is dispensed by means of a propellant gas. For ecological reasons, the propellants used previously, which were generally CFC-based, have been replaced by other propellant gases, and in particular propellant gases of the HFC-134a or HFC-227 type. It turned out that this change of the propellant gas gave rise to various stresses on the seals, whether regarding the sealing effectiveness of the said seal, or regarding extractible substances, when the said seal was in contact with these new propellant gases. It so happened that the seal materials normally used in aerosol valves in conjunction with CFC gases could not be applied easily to the new propellant gases. Various materials were therefore developed for use with these HFC gases. Of these materials, ethylene propylene (EP) and ethylene propylene diene monomer (EPDM) turned out to be appropriate materials. Another problem that arises with HFC gases, is that when they are used with a latent solvent, such as ethanol for example, there is a tendency for the alcohol, which is less soluble in the liquid phase of the HCFs, to separate out, thus exposing the seals to a higher concentration of alcohol than has been the case previously with the CFC gases. Ethylene propylene and ethylene propylene diene monomer have also proven to be appropriate materials for solving this problem.

Document EP-0 969 069 describes a valve seal that is intended for a fluid product dispenser that includes EPDM as well as a mineral filler that includes magnesium silicate and/or Kaolin. The purpose of these mineral fillers is to improve the properties of the seal, and in particular the aspects concerning its sealing properties.

The purpose of this present invention is to supply a valve seal that includes a different mineral filler, in order to obtain good characteristics for the seal, in particular those aspects concerning the effectiveness of its sealing properties, its elastic properties, and the manufacturing process of the seal.

Another objective of this present invention is to provide such a valve seal with improved sliding properties and with a reduced extractible substances leeching rate.

A further objective of this present product is to supply such a valve seal which is simpler and less costly to manufacture than the previously known valve seals.

The subject of this present invention is therefore a valve seal that is intended for a fluid product aerosol dispenser, characterised in that the said seal includes an elastomer which is based upon ethylene propylene (EP) and/or ethylene propylene diene monomer (EPDM), and a mineral filler that is based upon quartz (SiO_2) and Kaolinite ($Al_4[(OH)_8Si_4O_{10}]$).

Advantageously, the mineralogical composition of the mineral filler includes between 65 % and 95 %, preferably about 80 %, of quartz, and between 5 % and 35 % preferably about 20 %, of Kaolinite.

Advantageously, the chemical composition of the mineral filler includes between 3% and 15%, preferably about 8 %, of Al_2O_3, and between 75 % and 95 %, preferably about 87 %, of SiO_2.

Advantageously, the mineral filler has a pH greater than 6, preferably between about 7 and 8.

Again advantageously, the mineral filler has an average particle size of between 1.5 and 4 microns, preferably about 2.2 microns.

Advantageously also, the said seal, before its assembly into a fluid product aerosol dispenser, is subjected to a surface chlorination treatment.

Advantageously again, the said seal is immersed in a solution containing water, hydrochloric acid and bleach.

Another objective of this present invention is a measuring-out valve for a fluid product aerosol dispenser that includes at least a valve seal as described above.

This present invention also has as its objective a fluid product aerosol dispenser that includes a reservoir containing a fluid product and a propellant gas, and a valve, preferably a measuring-out valve, mounted on the said reservoir, where the said valve includes at least a valve seal as described above.

Advantageously, the said valve includes a valve element sliding in a valve body with the interposition of a valve seal, where the said valve seal is made as described above.

Advantageously, the said propellant gas includes HFC-134a gas and/or of the HFC-227 gas.

Advantageously, the reservoir also contains alcohol, ethanol in particular.

Another objective of this present invention is a manufacturing process for a valve seal intended for a fluid product aerosol dispenser, characterised in that the process includes the following stages:

- creation of a seal that includes an elastomer based upon ethylene propylene (EP) and/or ethylene propylene diene monomer (EPDM), and a mineral filler based upon quartz (SiO_2) and kaolinite ($Al_4[(OH)_8Si_4O_{10}]$), and
- submission of this seal to a surface chlorination treatment.

Advantageously, the said surface chlorination treatment includes immersing the seal in a solution containing water, hydrochloric acid and bleach.

The mineral filler of this present invention has a structure which is both granular and lamellar. This results in improving the elastic properties of the seal, improving the effectiveness of the sealing properties of the seal, and also simplifies the manufacturing process of the said seal. A material that is particularly suitable to be used in accordance with this present invention is Sillitin, which is a natural mixture of quartz and kaolinite. This material has

never been used in the manufacture of valve seals, in particular of the type of dynamic valve seal in which the valve element slides.

The following two tables contain a comparison between Sillitin and kaolin, firstly regarding the aspects concerning their chemical formulae, and secondly the aspects concerning the characteristics of these products.

1)

1) Chemical formulae

Filler	**Formula**
Sillitin (Natural mixture of quartz (80%) and kaolinite (20%))	$Al_4[(OH)_8Si_4O_{10}] - SiO_2$
Kaolin	$Al_2O_3 - 2SiO_2$

2) Characteristics

Characteristics	**Sillitin**	**Kaolin**
Chemical analysis		
➢ Al_2O_3 (%)	8	44
➢ SiO_2 (%)	87	52
➢ Other (%)	5	4
pH	7-8	5-6
Average size of the particles (μm)	2.2	1.4

Referring in particular to the table concerning the characteristics, it can be seen that Sillitin contains much less Al_2O_3 and much more SiO_2 in relation to Kaolin. The granular and lamellar structure of Sillitin results in improving the effectiveness of the seal in relation to a seal with the same elastomer, such as EP or EPDM for example, but a mineral filler composed of Kaolin. The neutral pH can limit the interactions between the seal and the active ingredient contained in the fluid product to be dispensed.

It therefore emerges that a seal that includes EP and/or

EPDM, and a mineral filler that includes Sillitin, is particularly suitable for use with HFC gases. It is also particularly suitable to be used with HFC gases in the presence of alcohol, and ethanol in particular.

This present invention therefore results in improving the seal described in document EP-0 969 069.

According to one advantageous method of implementation, the seal can also be subjected to a surface chlorination treatment. This treatment is used in particular to reduce the electrostatic character of the seal. The properties of the seal, in particular its sliding quality, are therefore ameliorated. This treatment is also used to reduce the leeching of extractible substances, and therefore limits the risk of interaction with the active product. Advantageously, this surface treatment can be effected by immersing the seal in a solution containing water, hydrochloric acid and bleach. This leads to the formation of chlorine which attaches itself to the surface of the seal.

Although this present invention has been described with reference to one implementation example, namely the use of Sillitin, it is intended that the invention should not be limited to this single implementation method, but that, on the contrary, a professional engineer should be able to effect appropriate changes without moving outside the context of the invention as described by the following claims.